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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/816,487

03/31/2004

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LAM2P451

1220

25920 7590 09/01/2009  
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EXAMINER

MACARTHUR, SYLVIA

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

09/01/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/816,487  
Filing Date: March 31, 2004  
Appellant(s): MIKHAYLICHENKO ET AL.

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George B. Leavell  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed May 20, 2009 appealing from the Office action mailed June 12, 2008.

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**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

a) Claims 10 and 16 are rejected under 35 U.S.C. 103(a) as being obvious over de Larios et al in view of Yuji et al (JP 2001-220688, using the examiner provided English Translation) and Ballance et al(US 6,090,210).

b) Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yun et al or deLarios in view of Yuji et al and Ballance et al as applied in claims 10 and 16 above, in view of Kawamura et al.

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c) Claims 15, 17, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over deLarios in view of Yuji et al and Ballance et al as applied in claims 10 and 16 above, in further view of Kenji et al (JP 08-277486).

d) Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over deLarios in view of Yuji et al, Kenji et al, and Ballance et al as applied in claims 15,17, 20, and 21 above, in further view of Kawamura et al.

### **NEW GROUND(S) OF REJECTION**

\*Note The US Publication application number (11/061,944) of Yun et al was used for the obvious double patenting rejections in the Final Rejection. However for the consistency of the Board, the statements of the obvious double patenting rejections have been updated to reflect that the co-pending application (S/N 11/061, 944) has been patented and is now (US 7,329,321). The body of the rejections have been maintained, but basis their rejection statements have been changed to reflect the corresponding US patent number.

a) Claims 10, 16, 17, and 21 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-20 of US 7,329, 321\* held to Yun et al in view of Yuji et al (JP 2001-220688) and de Larios et al (US 6,488, 040) and Ballance et al(US 6,090,210).

b) Claims 11-14, 18, and 19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-20 of copending to Yun et al in view of Yuji et al, De Larios and Ballance et al as applied to claims 10, 16, and 17 above, in further view of Kawamura et al.

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c) Claims 15 and 20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-20 to Yun et al in view of Yuji et al ,de Larios et al ,Ballance et al and Kenji et al JP 08-277486.

### **WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

A) Rejections of claims 10-21 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

B) Rejections of claims 11-14 under 35 USC 103 (a) as being unpatentable over Yun et al (US 2002/0124153) in view of Ballance et al (US 6,090,210), and in further view of Kawamura et al (US 5,696,348).

### **(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

### **(8) Evidence Relied Upon**

<b>Patent Number</b>	<b>Inventor(s)</b>	<b>Publication Date</b>
7,329,321*	Yun et al	06-2006
JP 2001-220688	Yuji et al	08-2001
6,488,040	de Larios et al	12-2002
6,090,210	Ballance et al	07-2000
5,696,348	Kawamura et al	12-1997
JP 08-277486	Kenji et al	10-1996

\*Note The US Publication application number (11/061,944) of Yun et al was used for the obvious double patenting rejections in the Final Rejection. However for the consistency of the Board, the statements of the obvious double patenting rejections have been updated to reflect that the co-pending application has been patented. The body of the rejections have been maintained, but basis their rejection statements have been changed to reflect the corresponding US patent number.

#### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

##### ***Double Patenting***

Claims 10, 16, 17, and 21 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of US 7,329,321 held to Yun et al in view of Yuji et al (JP 2001-220688) and de Larios et al (US 6,488, 040) and Ballance et al(US 6,090,210). Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of the present invention is narrower than the patent by Yun et al.

Yun et al claims a method for removing post processing residues in single substrate cleaning system comprising a proximity head provided with a first fluid that flow through the proximity head, heating a first fluid in the proximity head, see claims 1 and 8.

Regarding claims 10, 16, and 21: Yun et al fails to teach a sensor the structure of the proximity head such as the outlet ports and vacuum inlet ports.

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Yuji et al teaches a spraying nozzle (also a fluid distributor) with a heat source 12 and 23' wherein the heating portion is interpreted as the combination of 12 and 23'. According to [0030] the heating portion is equipped with a thermocouple 13 ( temperature sensor), see Figures 1,3, and 4. Moreover, [008] teaches that each heater 12 has a thermocouple 13 thus allowing the concentration of the reactive fluid and temperature to be controlled correctly and the film property of the thin film and uniformity of treatment attained. Furthermore, the motivation to use the heating portion/temperature thermometer of Yuji et al in the proximity head of Yun et al is that the temperature of the processing fluid is an important processing parameter that when monitored can improve the processing result. Thus, it would have been obvious to modify the proximity head of de Larios et al to include a temperature sensor for the heating portion.

Yun et al as modified by Yuji et al further fails to claim the inlets/outlets as recited in claim 10 of the present invention.

De Larios et al teaches capillary proximity heads. The proximity head having inlets and outlets as illustrated in Figs 6-8. The motivation to use the proximity head of de Larios in the apparatus of Yun et al in view of Yuji et al is that it provides a means of cleaning and drying a wafer simultaneously as recited by the title and in col. 4 lines 31-45. Thus, it would have been obvious for one ordinary skill in the art at the time of the claimed invention to combine the teachings of Yun et al, Yuji et al and de Larios to provide a capillary proximity heater with a heater/temperature sensor component in the head.

Regarding claim 17: The claims of Yun et al anticipate a fluid source as the first fluid is provided inherently by a source, a proximity head with a heater, and a step of controlling the

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moving of the substrate so that the meniscus of the first fluid contacts the surface of the substrate for a specified time.

The combination of Yun et al with Yuji et al and de Larios fails to teach channels as claimed in the present invention.

Yun et al individually nor Yun et al in combination with Yuji et al and deLarios does not specifically recite a channel in the heating portion, the channel being configured to guide the liquid through the heating portion. Yun et al does recite a meniscus forming between a surface of the substrate and an opposing surface of the proximity head see claims 1, 4, and 8

Note the channel is interpreted as flow path through the heating portion guiding the liquid to the substrate.

The prior art Ballance et al (US 6,090,210) teaches a heating portion (heater with a plurality of lamps) in the showerhead see Figure 1 wherein channels (tubes 46) are provide between the lamps in the heating portion to provide heat transfer (cooling). The prior art of Ballance et al is introduced to show that it is conventional to introduce channels within a heating portion to provide better temperature control.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide channels within the heating portion in order to provide enhance temperature control of the heater and the fluid transferred there through.

Claims 11-14, 18, and 19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of US 7,329,321 held to Yun et al in view of Yuji et al , De Larios and Ballance et al(US 6,090,210) as applied to claims 10, 16, and 17 above, in further view of Kawamura et al (US 5,696,348).



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The teachings of Yun et al in view of Yuji et al, de Larios et al and Ballance et al.

Yun et al in view of Yuji et al fails to teach the material of construction of the heater with a thermocouple/thermometer.

Kawamura et al teaches a thermocouple constructed of a protective pipe made of SiC see col. 2 lines 65. The motivation to use SiC as the material of construction is that is a known heat resistant ceramic material. Kawamura et al further teaches the thermocouple comprises wires, see the abstract. These wires are for coupling to a power supply see col.3 lines 38-40. In order to be used to conduct electricity the wires are obviously made of an electrically conductive material. Thus, it would have been obvious to construct the heater/temperature sensor of the materials taught by Kawamura et al with wires and a protective coating to provide electricity to the heater/sensor while protecting it from the harsh physical/chemical environment of the semiconductor manufacturing system.

Claims 15 and 20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of US 7,329,321 held to Yun et al in view of Yuji et al, de Larios et al (US 6,488, 040), , Balance et al (US 6,090,210) and Kenji et al (JP 08-277486). Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of the present invention is narrower than the application by Yun et al.

The teachings of Yun et al in view of Yuji et al, de Larios and Ballance et al were discussed above. This modification fails to teach a plurality of channels that are separate in the heating portion.

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The apparatus of Kenji et al teaches a plating device with heaters 11 (the totality of which is interpreted as the heating portion) that comprises separate channels, see Figs. 1-3. The motivation to modify the apparatus of Yun et al in view of Yuji et al and de Larios with the apparatus of Kenji et al is that this configuration of a heating portion allows for the substrate to be heated more rapidly. See the English Abstract of Kenji et al and [0018]. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Yun et al in view of Yuji et al and de Larios with the plurality of separate channels in the heating portion of Kenji et al.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10 and 16 are rejected under 35 U.S.C. 103(a) as being obvious over de Larios et al US 6,488,040 in view of Yuji et al (JP 2001-220688, using the examiner provided English Translation) and Balance et al(US 6,090,210).

De Larios et al teaches capillary proximity heads. The proximity head (a fluid distributor) with a bottom surface having inlets and outlets as illustrated in Figs 6-8.

Re claim 10: DeLarios fails to teach the proximity head comprises a heating portion.

Yuji et al teaches a spraying nozzle (also a fluid distributor) with a heat source 12 According to[0030] the heater is equipped with a thermocouple 13 ( temperature sensor).

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Moreover, [008] teaches that each heater 12 has a thermocouple thus allowing the concentration of the reactive fluid and temperature to be controlled correctly and the film property of the thin film and uniformity of treatment attained. Furthermore, the motivation to use the heating portion/temperature thermometer of Yuji et al in the proximity head of de Larios is that the temperature of the processing fluid is an important processing parameter that when monitored can improve the processing result. Thus, it would have been obvious to modify the proximity head of de Larios et al to include a heater with a temperature sensor.

The combination of de Larios and Yuji et al fails to teach channels within the heating portion wherein the channels are configured to fluid liquid through the heating portion.

Note the prior art Ballance et al teaches a heating portion (heater with a plurality of lamps) in the showerhead see Figure 1 wherein channels (tubes 46) are provide between the lamps in the heating portion to provide heat transfer (cooling). The prior art of Ballance et al is introduced to show that it is conventional to introduce channels within a heating portion to provide better temperature control of the heating portion.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide channels within the heating portion in order to provide enhance temperature control of the heater and the fluid transferred there through.

Regarding claims 16 and 21: The thermocouple of Yuji comprises a controller 14 comprised heat controller 15 as a part of its structure and function of detecting the temperature.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yun et al or deLarios in view of Yuji et al and Ballance et al as applied in claims 10 and 16 above, in further view of Kawamura et al.

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The teachings of de Larios in view of Yuji et al and Balance et al were discussed above.

This modification fails to teach the material of construction of the heater with a thermocouple/thermometer.

Kawamura et al teaches a thermocouple constructed of a protective pipe made of SiC see col. 2 lines 65. The motivation to use SiC as the material of construction is that is a known heat resistant ceramic material. Kawamura et al further teaches the thermocouple comprises wires, see the abstract. These wires are for coupling to a power supply see col.3 lines 38-40. In order to be used to conduct electricity the wires are obviously made of an electrically conductive material. Thus, it would have been obvious to construct the heater/temperature sensor of the materials taught by Kawamura et al with wires and a protective coating to provide electricity to the heater/sensor while protecting it from the harsh physical and chemical environment of the semiconductor manufacturing system.

Claims 15,17, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over deLarios in view of Yuji et al and Ballance et al as applied in claims 10 and 16 above, in further view of Kenji et al (JP 08-277486).

The teachings of de Larios in view of Yuji et al and Balance et al were discussed above. Regarding Claims 15 and 20: This modification fails to teach a plurality of channels that are separate in the heating portion. The apparatus of Kenji et al teaches a plating device with heaters 11 (the totality of which is interpreted as the heating portion) that comprises separate channels, see Figs. 1-3. The motivation to modify the apparatus of Yun et al in view of Yuji et al and de Larios with the apparatus of Kenji et al is that this configuration of a heating portion allows for the substrate to be heated more rapidly. See the English Abstract of Kenji et al and [0018]. Thus,

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it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of deLarios as modified by Yuji et al and Ballance et al with the plurality of separate channels in the heating portion of Kenji et al.

Regarding claim 17: This modification fails to teach a first and second member as claimed in the present invention. See first member of Kenji et al is the vertical displacement device used to vertically move the proximity head of Kenji et al see Figs. 1-3 and the second member (press block 1 and/or jig 4 ) that support lead frame 2 (substrate). The motivation to provide the first and second members of the prior art of Kenji et al is that these members allow for better control of the spacing between the proximity head (fluid distribution member includes injection nozzles 5). Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to use the teachings of Kenji et al to provide a more efficient way to treat the substrate.

Regarding claim 21: Recall Yuji et al teaches a sensor (thermocouple 13) is coupled to controller 14 (thermometry machine) and heat controller 15.

Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over deLarios in view of Yuji et al, Kenji et al, and Ballance et al as applied in claims 15,17, 20, and 21 above, in further view of Kawamura et al.

The teachings of de Larios in view of Yuji et al, Kenji et al, and Ballance et al were discussed above.

This modification fails to teach the material of construction of the heater with a thermocouple/thermometer.

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Kawamura et al teaches a thermocouple constructed of a protective pipe made of SiC see col. 2 lines 65. The motivation to use SiC as the material of construction is that is a known heat resistant ceramic material. Kawamura et al further teaches the thermocouple comprises wires, see the abstract. These wires are for coupling to a power supply see col.3 lines 38-40. In order to be used to conduct electricity the wires are obviously made of an electrically conductive material. Thus, it would have been obvious to construct the heater/temperature sensor of the materials taught by Kawamura et al with wires and a protective coating to provide electricity to the heater/sensor while protecting it from the harsh physical and chemical environment of the semiconductor manufacturing system.

#### **(10) Response to Argument**

A) Appellant argues on page 9, paragraph 3 that the prior art of deLarios does not teach any particular arrangement of the inlet portions and outlet ports in the proximity head. However, Figures 6 and 8 of deLarios illustrates vacuum inlets 142 and outlet ports 140 wherein the inlet ports do surround the plurality of outlet ports.

B) Appellant further argues on page 9, paragraph 3 that the size of the source outlets are very small in diameter and provided the required capillary action to remove the liquid from the meniscus. According to col. 5 lines 51-67, the proximity head moves about the wafer plane to initiate capillary action. The claims of the present invention do not exclude small sized inlets and/or outlets it is only required that the inlets surround the outlet ports as is illustrated by the prior art of deLarios.

C) Appellant also argues on page 10, second paragraph that the nozzle of Yuji is intended for spraying a liquid and is not the same or similar to the proximity head of the

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present invention. However, the use of nozzle of Yuji does not negate that it provides a suggestion of using temperature sensors along with heaters to ensure accurate temperature control in fluid supply devices.

D) Likewise, appellant argues that the showerhead of Ballance is non-analogous of the proximity head of the present invention. However, the teachings of Balance et al provided a suggestion of providing cooling channels in the heating portion of fluid supply devices to ensure that the temperature of the fluid treating the wafer is uniform.

E) Appellant argues that the thermocouple of Kawamura is not the same as the proximity head introduced by appellant. The teachings of Kawamura et al were provided to show that the material of construction of the sensors is an obvious choice of design. Kawamura merely shows that the use of SiC as a material of construction is common as SiC is a widely used material known for its optimal chemical and physical properties in the harsh semiconductor manufacturing environment.

F) Appellant argues that the plating device of Kenji is not the same or suggesting of the proximity head of the claimed invention. According to deLarios col. 4 lines 46-55, the manifold and proximity head moves into a position in close proximity to the wafer by movement 119, but do not teach a member as recited in claim 17. Kenji et al merely provides a specific structure to perform the claimed movement found in deLarios.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

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Respectfully submitted,

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